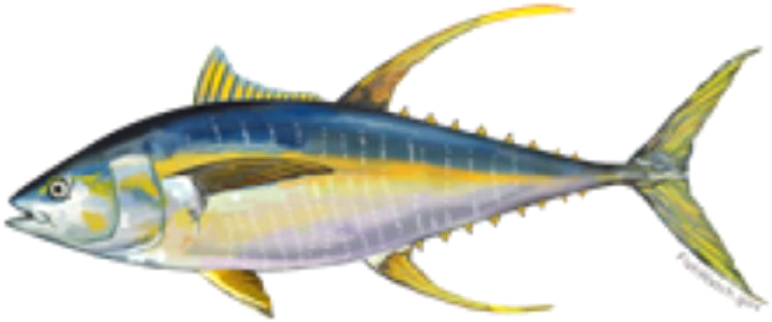
NOAA FISHERIES

Southeast Fisheries Science Center

Overview of SEFSC assessments – ICCAT –

(International Commission for the Conservation of Atlantic Tunas)

Example: Yellowfin Tuna



Craig Brown
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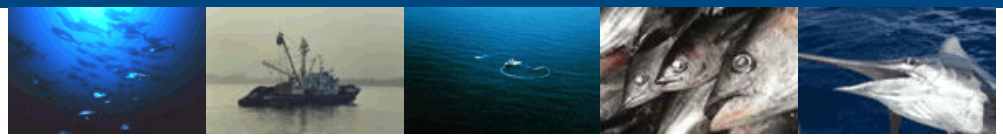
Sustainable Fisheries Division

Outline

- Overview of ICCAT process
- Assessment frequency
- Data preparation
- Modeling description
- Documentation
- Follow-up analyses and presentations
- Management actions

Overview of ICCAT process:



ICCAT is responsible for the management of tunas and tuna-like species in the Atlantic Ocean and adjacent seas. In practice, along with bycatch species, this includes:

- Atlantic Bluefin
- Bigeye
- Skipjack
- Yellowfin
- Albacore
- Swordfish
- White Marlin
- Blue Marlin
- Sailfish
- Spearfishes

Pelagic Sharks, such as

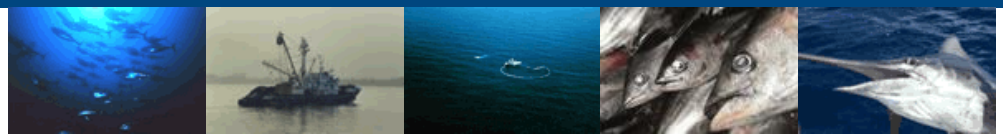
- Blue Shark
- Shortfin Mako
- Porbeagle

U.S. domestic regulations for HMS cannot conflict with measures negotiated and adopted by ICCAT.
(But they can be more restrictive).

Although not yet assessed. . .

- Spotted Spanish Mackerel
- King Mackerel
- small tunas (e.g. Black Skipjack, Frigate Tuna, Atlantic Bonito)

Overview of ICCAT process:

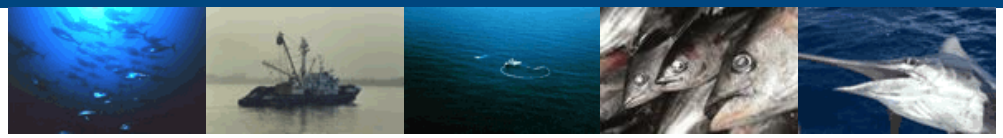


ICCAT's Standing Committee on Research and Statistics (SCRS) is responsible for providing scientific advice to the Commission

- **Defining procedures** for the collection, compilation, analysis and dissemination of fishery statistics
- **Conducting research** with a principal focus on the effects of fishing on stock abundance
- **Planning/Coordinating** various national and international cooperative research programs
- Carrying out **stock assessments** and providing **management advice**

The ICCAT SCRS acts like an SSC and SEDAR combined: it conducts research and analyses, reviews results and conclusions, and delivers the scientific advice (periodically with independent reviewers), however the Commission is not compelled to follow the SCRs advice (and often doesn't).

Overview of ICCAT process:



ICCAT ASSESSMENT FREQUENCY BY STOCK															
Stock	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Bluefin - West			■				■		■		■		■		■
Bluefin - East			■				■		■		■		■		■
Bigeye			■		■			■			■				
Skipjack - West									■						■
Skipjack - East									■						■
Yellowfin	■			■					■			■			
Albacore - North	■							■		■				■	
Albacore - South				■				■				■		■	
Albacore - Med											■	■			
Swordfish - North			■				■			■				■	
Swordfish - South			■				■			■				■	
Swordfish - Med				■				■			■				■
White Marlin			■				■						■		
Blue Marlin							■					■			
Sailfish - West		■								■					
Sailfish - East		■								■					
Blue Shark					■				■						
Shortfin Mako - N&S					■				■				■		
Porbeagle - multiple										■					

Data preparation – USA Removals

- Commercial Landings
- Commercial Discards
- Charter Boat Landings
- Private Boat Landings
- Charter Boat Discards
- Private Boat Discards
- Headboat Landings
- Headboat Discards
- Headboat Observer Discards
- Early landings/ size composition

Separate Data Programs:

ALS

Bluefin Dealer Reports

Pelagic Longline Observers/Logbook

LPS/MRFSS/MRIP

RBS/ALRS/TPWD(minor)

SRHS (minor)

Headboat Observers (minor)

Historic data:

Sensitivity Analyses by WG (rare)

Submitted for prior year by July 31, or as required in advance of meetings

Species ID can be an issue at smaller sizes

Data preparation – USA Compositions

Age Composition Data:

NO SAMPLING

Exception: Bluefin tuna otolith sampling was instituted in 2010, with the goal of collecting representative samples from the U.S. fisheries.

Length/weight Composition Data:

Commercial Landings: good reporting of individual weights

Commercial Discards: limited to approximate estimates by pelagic longline observers

Recreational Landings: low sample sizes, patchy coverage

Recreational Discards: No sampling, few dead discards, and mortality generally considered to be low

Data Programs:

Obtained through the same programs that provide catch info

- Complete absence of data on age composition
- Low sample sizes and often poor coverage for recreational catches
- Irregular sampling through the years
- May be biases in availability for measurement

Data preparation - Indices

Commercial Longline Index

Rod and Reel Index (Commercial and Recreational)

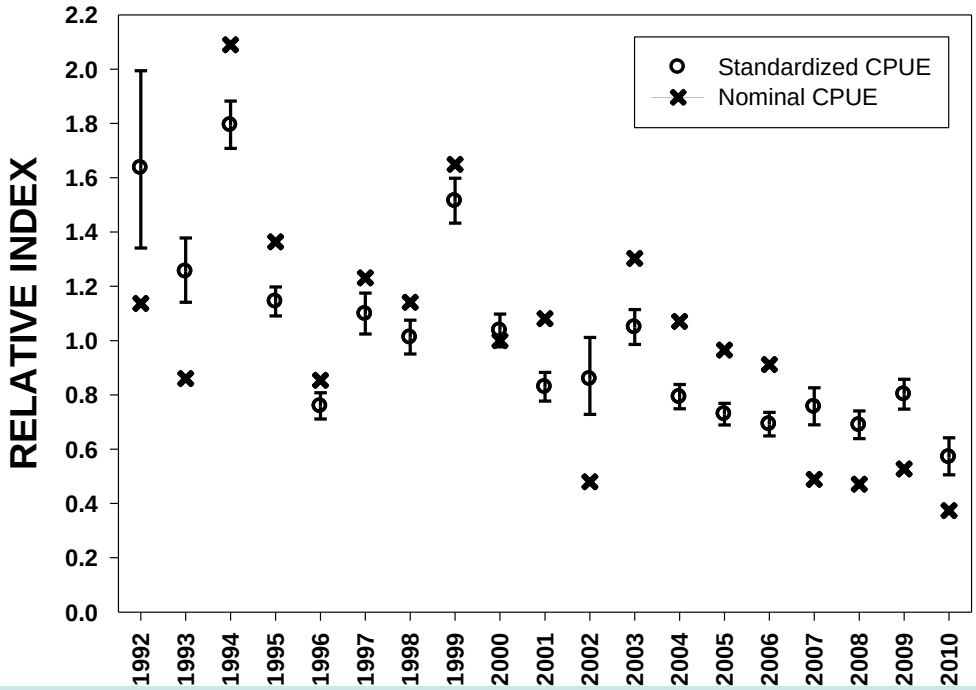
Fishery Dependent Programs:

Pelagic Longline Observers/Logbook

LPS/MRFSS/MRIP/RBS

Catch rates are standardized

Delta-GLM to account for effects such as target, location, season, gear configuration, etc.

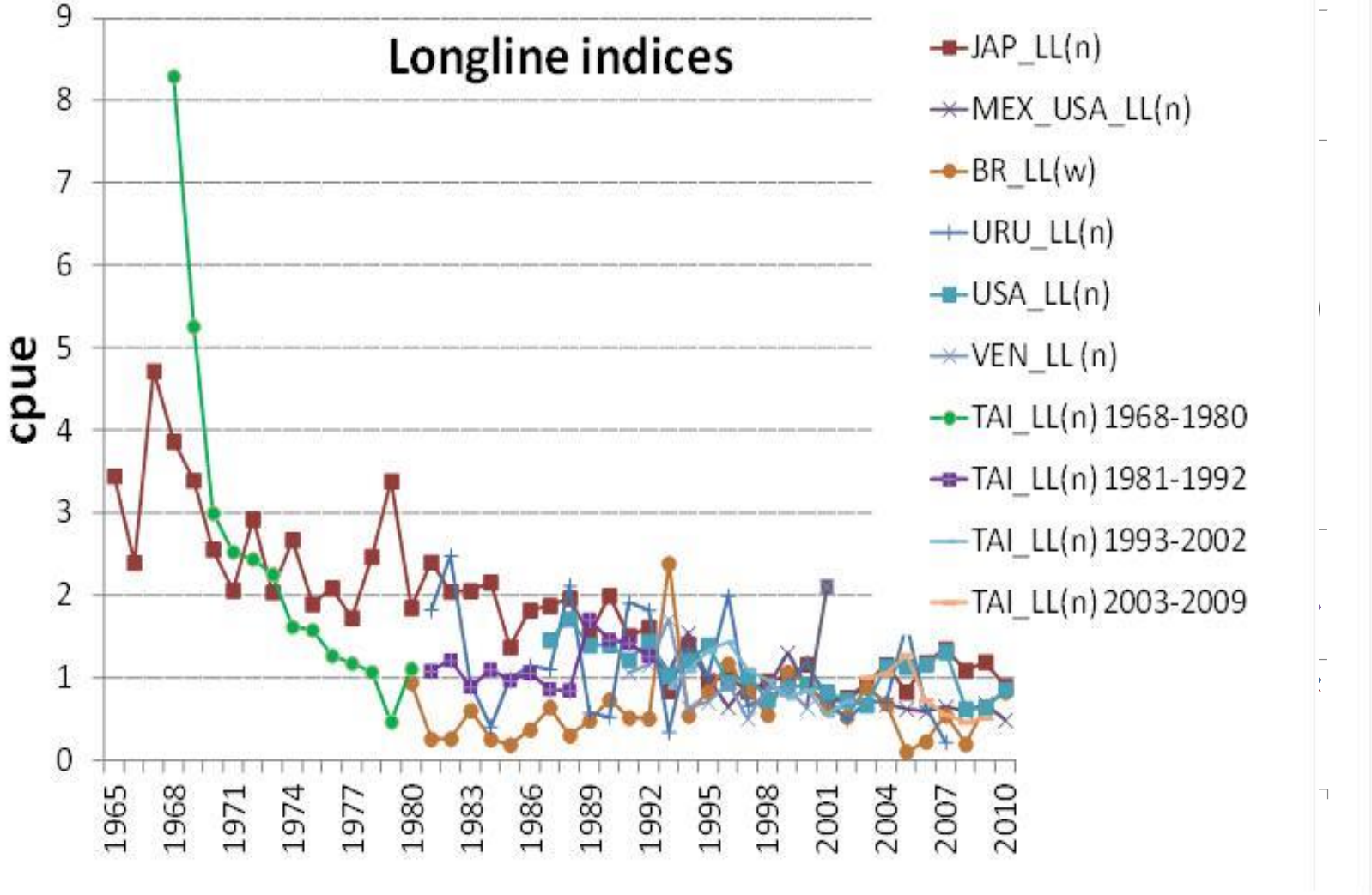


Fishery Independent Indices:

Only GOM larval survey, bluefin and skipjack have been developed

Data preparation - Indices

Available at assessment



Data preparation – Life History

Life history research:

HMS/SFD: conventional and electronic tagging, other biological research Calculation of parameters from fishery data

Panama City – ageing, shark research

Age-Growth

Research conducted for other HMS (e.g. bluefin, billfish). For yellowfin tuna, evaluated implications of alternative growth parameters and models.

Maturity

Research conducted for other HMS (e.g. bluefin, billfish). For yellowfin tuna, calculated alternative functions (e.g. Lorenzen and evaluated implications.

Natural Mortality

Calculated alternative functions (e.g. Lorenzen and evaluated implications.

Discard Mortality

Research conducted on bluefin post-release mortality from longline, no research on yellowfin

Brief modeling description

Models:

1. An age-structured estimation model (VPA-2Box)
   - Population cohorts are estimated by a backward projection method, minimizing the sum of squares difference between the population abundance estimates and a set of one or more abundance indices
   - Capable of analyzing two stocks, with intermixing
2. A Surplus-Production Model Including Covariates (ASPIC)

Inputs:

- landings
- fishery-dependent relative indices of abundance (methods and data quality vary)
- [VPA] catch-at-size (often heavily substituted using size-frequency n from other fisheries)
- growth function
- **NO** fishery independent abundance data
- **NO** age samples (ages are assigned by "age slicing" from growth curve)
- **NO** verified discard estimates

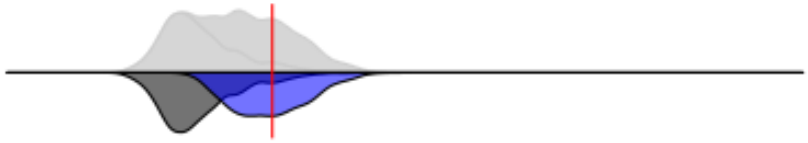
Uncertainty:

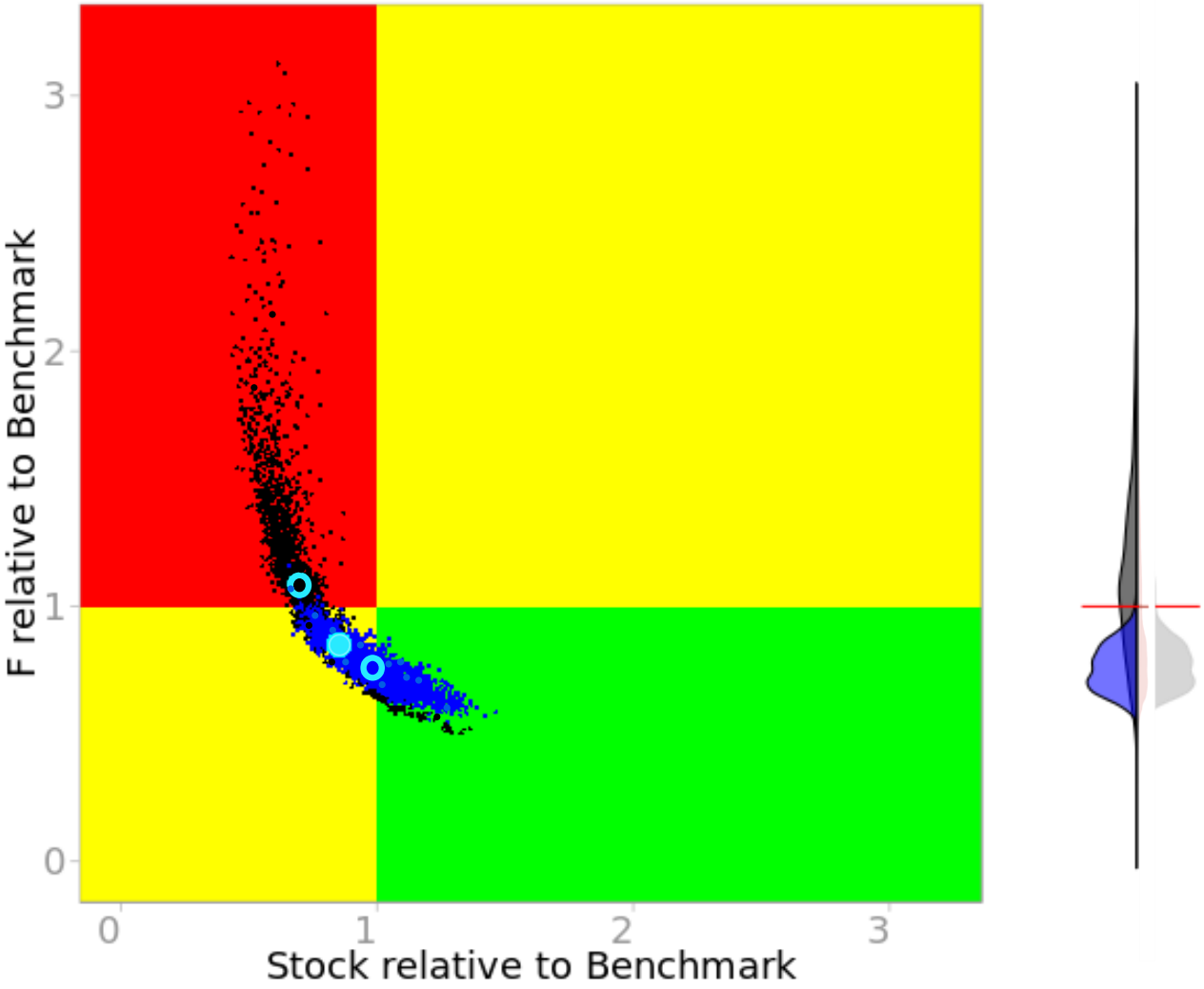
- Bootstrap residuals of index fits
- Multiple alternative base cases may be incorporated into final results, and/or sensitivity run results may be reflected in the results

Documentation

- Working papers and reference documents
- Reports for data prep (if conducted) and assessment meetings
- Peer review reports issued separately (written by contracted outside expert participating in the assessment)
- All docs posted on ICCAT website, organized by SCRS number
  - Working papers and reports published in Collected Volume of Scientific Papers

Results





Follow-up analyses and presentations

- VPA model selected for management was changed based on diagnostics and analyses completed after the assessment meeting
- The meeting report was unchanged, but a supplement was produced and adopted by the working group (revision to base model after the assessment meeting is rare)
- Multiple sets of projections and yield-per-recruit analyses for SCRS consideration
- Multiple responses to questions about the assessment, including questions from fishermen, IAC, U.S. ICCAT Commission delegation, and NMFS HQ, and Congress
  - Related questions still arise (and likely will until the next assessment)

Management actions following 2011 yellowfin tuna stock assessment

Commission called for a Multi-annual Management and Conservation Program for the period 2012-2015, for the bigeye and yellowfin fisheries:

- Capacity limitation on 20+ meter vessels fishing bigeye (these may also fish for yellowfin)
- Total allowable catch of 110,000 t for yellowfin beginning in 2012 (consistent with SCRS advice that catches at that level should lead to B >B_{MSY} with 60% probability by 2015).
  - If exceeded, the Commission will review relevant management measures.
  - No country-specific yellowfin tuna quotas.

Summary - Strengths

Data:

- Review of available data and working documents by a broad spectrum of international experts.

Process:

- Excellent documentation of the whole process, easily accessible. Observers can attend meetings.
- Participation of national scientists, who are most familiar with details of fishery operations and data, biological considerations
- (Usually) thorough discussions of model structure and results
- Flexibility conducive to application of new models and incorporation of latest biological information

Results:

- Discussions about assumptions and results, healthy skepticism

Management:

- Scenarios and projections explored, to frame management advice

Summary - Challenges

Data:

- Fishery dependent abundance indices suffer from changing catchability.
  - Particularly true for purse seine and baitboat indices, where there is an inability to account for the dramatically increased use of floating objects/fish aggregating devices (FADs) in standardized effort calculations.
  - Largest impact on indices for the youngest ages, but also affects free school indices developed from purse seine and baitboat effort.
- No age samples – age slicing likely smears cohorts.
- Many sectors are poorly sampled, requiring substitutions
- At small sizes, yellowfin can be reported as skipjack or bigeye in the landings (and vice versa).

These problems can produce poor selectivity and recruitment estimates, and cause problems in the estimation of stock status.

Summary - Challenges

Process:

- Use of resources in prep work and travel
- Demand is different from that of SEDAR:
  - Fewer SEFSC personnel involved, assessment workload shared by more scientists
  - Substantial prep work for meetings (e.g. development of indices and statistically integrated models)
  - Assessment process compressed into one or two 5-10 day meetings

Summary - Challenges

Results:

- Limited time for assessment meeting can reduce time for thorough examination of results and (especially) model diagnostics
- Follow-up work often required (e.g. projection analyses, answers to questions, etc.)
- Differs from SEDAR process:
  - SCRS Chair is interface with Commission/U.S. lead with U.S. delegation, and generally respond to most questions from managers
  - Analysts may still be called upon to conduct follow-up work

Summary - Challenges

Management:

- Managers often call for assessments at a frequency which hampers efficiency and improvements to the process.
  - No harvest control rules, target is B_{MSY}
- Domestic regulations have often affected the ability to use fishery dependent data for abundance indices